ENVIRONMENTAL PRODUCT DECLARATION

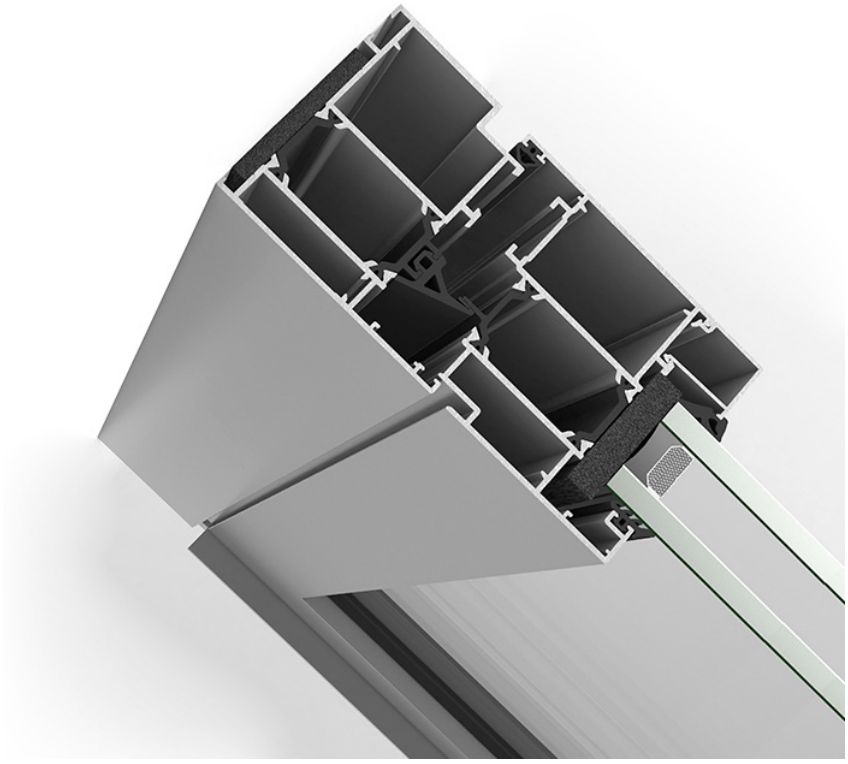
THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

STRUGAL

In accordance with ISO 14025 and EN 15804-2012+A2:2019 for

ALUMINIUM DOORS: STRUGAL S72RPC, STRUGAL S88RP ELEVABLE, STRUGAL S125RP, STRUGAL S140RP INFINITY, STRUGAL S150RP and STRUGAL S160RP HORIZON



EPD Program	The International EPD® System. www.environdec.com
Programme operator	EPD International AB
CPC Code	42120 Doors, windows and their frames and thresholds for doors, of iron, steel or aluminium
Based on	PCR 2019:14 Construction Products v1.0 and C-PCR-007 (to PCR 2019:14) Windows and Doors (EN 17213:2020) version:2020-04-09
Declaration number	S-P-05212
Publication date	2022-01-10
Valid until	2027-01-10
Market coverage	Worldwide

(*) An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

STRUGAL

At STRUGAL, we have been providing innovative solutions for building and industry for over 40 years. With a marked commitment to our customers and our environment, we are a clear reference in aluminium carpentry systems and façades for architects and developers, always seeking the satisfaction of our customers and the well-being of the end user.

We are constantly innovating, both in technological investment, in manufacturing processes and in the design of new products, trying to be at the forefront of the sector, improving every day.

With 6 production plants, its own technological center and international presence, STRUGAL is a company with headquarters at Alcalá de Guadaíra, Sevilla. We have more than 300,000 m2 of facilities, 1,500 employees in our production plants, 18 distribution centres and offices. We offer solutions for architecture and industry.

We offer a wide variety of products for the building industry, such as aluminium profiles, aluminium finished windows, PVC finished windows, aluminium doors, solar protection systems and light fronts.

Our systems meet the highest expectations in terms of quality and design, and STRUGAL provides a comprehensive service to the manufacturer-installer. From the profile, an infinite number of finishes and a wide range of accessories, to the corresponding tests, complying at all times with the regulations in force.

PRODUCT

Product description

The products included in this EPD are aluminium doors assembled from extruded coated/anodised aluminium profiles with thermal break manufactured by STRUGAL. The door systems declared are specific to the different series designed by STRUGAL, which include hinged and sliding doors with different glazing.

The doors are used as enclosures for openings in building facades, although they can also be installed indoors.

Composition

The doors consist of a frame assembled from coated/anodized aluminium profiles with thermal break. The thermal break is made by means of a reinforced polyamide strip sandwiched between two aluminium profiles. The leaf that houses the insulating glass unit (IGU) is also assembled from aluminium profiles.

Sash and frame are assembled using alignment brackets, joint brackets, fasteners, and other components known as fittings. Among these are also the systems that allow the opening of the leaf (handle, hinges, tilt-and-turn mechanism, etc.). To guarantee the air and water tightness of the window, gaskets made of EPDM and other plastic materials are installed.

The results of this EPD are representative for the following products: hinged door, serie STRUGAL S72RPC and sliding doors, STRUGAL S88RP Elevable, STRUGAL S125RP, STRUGAL S140RP Infinity, STRUGAL S150RP and STRUGAL S160RP Horizon.

The technical data of the declared products as well as their composition are shown in the following tables. None of the declared door systems contain substances included in the list of Substances of Very High Concern with a concentration of more than 0.1% by weight.

	STRUGAL S72RPC	STRUGAL S88RP ELEVABLE	STRUGAL S125RP	STRUGAL S140RP INFINITY	STRUGAL S150RP	STRUGAL S160RP HORIZON
Frame thickness (mm)	72,5	74	125	137	150	157
Thermal break (mm)	24	34	34	34	34	34
IGU	6/16Arg/33.1BE	66.1/12Arg/44.1BE	44.1/20Arg/33.1BE	44.1/16Arg/44.1BE	88.2/16Arg/66.2BE	66.1/18Arg/66.1BE
Thermal insulation, frame-sash (W/m^2K) UNE-EN 10077-2	2,7	3,1	4,3	2,7	3	2,7
Thermal insulation (W/m^2K) UNE-EN 10077-2	1,8	1,8	2	1,5	1,9	1,5
Air tightness UNE-EN 12207	Clase 4	Clase 4	Clase 4	Clase 3	Clase 4	Clase 3
Water tightness UNE-EN 12208	2A	7A	7A	7A	9A	7A
Acoustic insulation Rw UNE-EN ISO 12354	-	33 dB (2)	38 dB (2)	27 dB	40 dB (2)	27 dB
Wind load resistance UNE -EN 12210	C5	C2/B3	C2	C3	C2	C3

(1) Annex B (2) UNE-EN ISO 10140-2

Packaging

The doors are generally transported directly to the building site from carpentry in trucks or vans. These vehicles usually have an inverted "V" pallet, so that the doors are placed vertically during the journey. doors are separated from each other by cardboard sheets or corners. The doors can be protected with plastic film and secured with straps or other elements. These packaging materials are included in the scope of this EPD.

Reference service life and use phase

According to the recently approved standard EN 17213 a reference service life of 30 years is assumed without IGU replacement.

Recycling and disposal

Aluminium products are highly recyclable. During aluminium profile production, all post-industrial scrap (extrusion drop-offs from cutting, unfit material and discards, etc.) is fed back into the billet production process. Proceed in the same way with the aluminum cutouts generated during the assembly of the window.

	STRUGAL S72RPC	STRUGAL S88RP ELEVABLE	STRUGAL S125RP	STRUGAL S140RP INFINITY	STRUGAL S150RP	STRUGAL S160RP HORIZON
Aluminium profile	**40.44 kg**	**40.71 kg**	**62.39 kg**	**38.42 kg**	**71.07 kg**	**41.26 kg**
Aluminium	35.02	35.28	56.99	33.91	65.11	37.40
Polyamide + fiber glass	3.87	4.03	3.18	3.07	3.78	2.39
Coating powder	1.56	1.40	2.23	1.44	2.17	1.47
IGU	**100.26 kg**	**277.30 kg**	**183.90 kg**	**237.94 kg**	**380.82 kg**	**361.92 kg**
Flat glass	47.80	161.82	99.97	114.49	210.34	176.16
Flat glass (low-e)	47.80	107.88	74.98	114.49	157.76	176.16
Zeolite	1.57	1.42	2.28	1.96	1.87	2.22
PVB	1.32	4.47	4.14	4.74	8.71	4.87
Polysulfide	0.93	0.83	1.34	1.15	1.10	1.31
Aluminium	0.72	0.73	0.98	0.90	0.86	0.99
Argon	0.08	0.11	0.16	0.15	0.14	0.17
PB	0.03	0.05	0.05	0.05	0.05	0.06
Gasket and fittings	**6.51 kg**	**16.65 kg**	**12.04 kg**	**20.66 kg**	**16.53 kg**	**20.99 kg**
EPDM	2.68	2.35	0.97	2.32	1.39	2.50
Aluminium	2.14	1.51	2.38	2.48	1.96	2.73
Stainless steel	0.69	1.13	1.52	0.95	1.54	1.20
Zamak	0.39	1.58	2.05	0.84	2.05	0.25
Steel	0.19	3.40	3.30	0.10	3.22	0.03
Polyolefin	0.18	0	0	0	0.16	0
PA	0.12	0.09	0.38	0.63	0.40	0.15
PE	0.07	0.02	0	0	0	0
TPE	0.04	7.00E-03	7.00E-03	0	7.00E-03	0
Bronze/Brass	1.43E-03	0	0	0	0	0
POM	1.40E-03	0.06	0.02	0	0.02	0
PIR	0	0	0	1.16	0	1.31
PC	0	0	0	0	0	0.09
TPV	0	3.80E-03	7.20E-03	0	7.20E-03	0
ABS	0	0.01	0.01	0	0.01	0
PVC	0	4.12	1.24	8.48	3.39	8.96
PP	0	2.37	0.15	3.71	2.38	3.78
Secondary material	**38.46 kg**	**22.88 kg**	**25.24 kg**	**43.94 kg**	**23.81 kg**	**2363 kg**
Renewable material	-	-	-	-	-	-
Packaging			**0.91 kg**			
Cardboard			0.16			
Plastic film			0.75			
Biogenic carbon			0.06 kg			

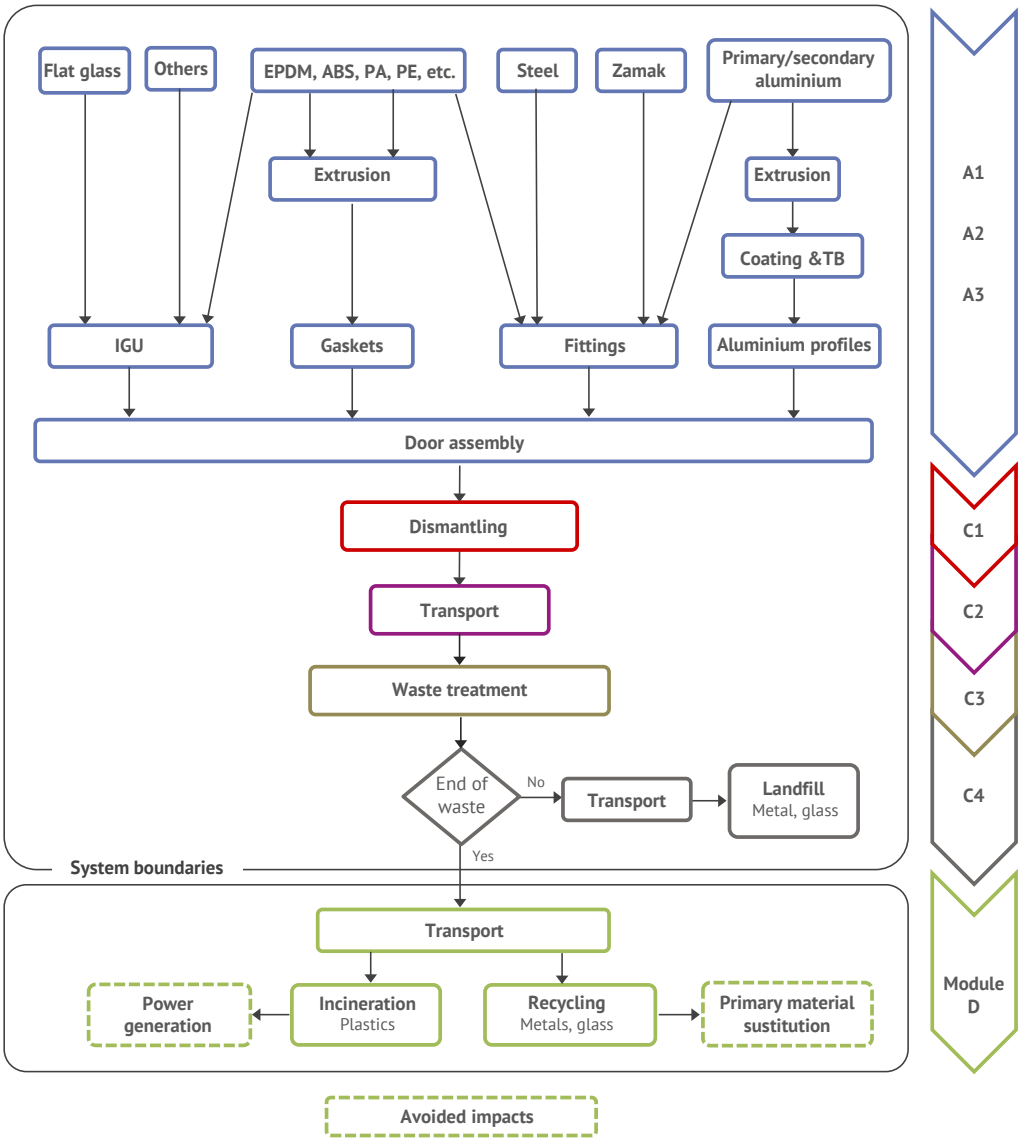
When an aluminium building product reaches the end of its life, it is systematically and selectively collected and sent to recycling facilities for secondary billet production. A collection rate for aluminium products next to 95% is well documented in construction sector and included as default value in EN 17213. Finally, recycling rate depends on smelting yield that includes metal losses during scrap preparation and melting.

Hence, aluminium supply at the beginning of the product system has a content of recycled material from post-industrial and post-consumer scrap with the consequent reduction of environmental burdens. In module D are reported only the net benefits of recycling, i.e. the burder savings at the end of life minus the benefits already considered in the module A1 due to secondary aluminium content. In this EPD, the scrap not collected at the end of life (5%) is sent to landfill.

For the rest of the components of the windows, i.e. IGU, fittings and gaskets, EoL scenarios have been setup according to default values specified in EN 17213.

System boundaries

The scope of the study is set to be "Cradle-to-gate with options". Processes included in the assessment are presented on the diagram below.



LCA INFORMATION

Declared unit

The declared unit is 1 m^2 of enclosure for façade openings (doors) with the technical characteristics shown on page 2 and a reference service life of 30 years. In accordance with EN 17213, the indicators declared in this EPD have been calculated on the basis of a standard hinged door size of 2.00 m x 2.18 and standard sliding door size of 3.00 m x 2.18 m. To obtain the environmental impacts and other parameters referring to 1 m^2 of product, these indicators were divided by the area of the doors (4.36 m^2 y 6.54 m^2 respectively).

Goal and scope

This EPD evaluates the environmental impacts and parameters of 1 m^2 of door from cradle to gate with options (end of life and recycling). Hence, this is a cradle to gate EPD with C1-C2-C3-C4-D modules.

This EPD is the basis for B2B communication for customers and relevant stakeholders within the building sector.

System boundaries

This EPD provides information on the production stage of the aluminium profiles (raw material supply, transport to plants and manufacturing), IGU, fittings and gaskets and their end-of-life. Recycling potential of aluminium and others materials with burdens saving due to use in a second product systems is also reported. The information is presented in a modular way separated in the following stages.

A1-3 - Cradle to gate

The aggregation of the modules A1, A2 and A3 is allowed by EN 15804. This rule is applied in this EPD and denoted by A1-3. This module represents the manufacture and packaging of aluminium profiles (including extraction and processing of raw materials and the transport to production sites), the production of the rest of the components of the windows (IGU, fittings and gaskets), the transport of these components and the windows assembley. Packaging of windows is also included in this module.

C1 - De-construction

No information was found in the life cycle databases consulted for the dismantling operations of doors, nor was there a bibliography regarding the inputs or residues generated during these operations.Then there is no contribution on impact categories of this module. In order to make the results tables lighter, this module is not shown.

Stage	Production			Construction		Use							End-of-life				Resource recovery
Module	Raw materials supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse, recovery or recycling potentials
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Declared module	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU	EU	ES	-	-	-	-	-	-	-	-	-	ES	ES	ES	ES	EU

ND - Not declared

C2 - Transport to waste processing

A distance of 200 km has been assumed for the transport to scrap dealers. Transport is calculated on the basis of a scenario with the parameters described in the attached table.

C3 - Waste processing for reuse, recovery and/or recycling

It has been assumed that during the scrapping operations the same electricity is consumed as during the assembly of doors.

C4 - Final disposal

End of life scenarios, routes for final disposal, recovery rates and efficiencies in recycling for all components are modelled based on default figures provided by EN 17213 (see attached table).

D - Allocation by reuse, recovery or recycling

For aluminium profiles, module D report the environmental burden of recycled scrap generated at the end of life minus that used at the production stage. Scrap inputs to the production stage are subtracted from scrap to be recycled at end of life in order to obtain the net scrap output from the product system. This remaining net scrap is then sent to recycling. Loads and benefits are assessed at the point of functional equivalence, i.e. where the substitution of primary aluminium takes place.

This criteria is also applied in the case of other metals and glass that are sent to recycling.

Parameters, C2 module	
Transport by road (1)	Lorry, 17.3 t max payload
Diesel consumption (l/km)	0.221
Distance (km)	200
Volume capacity utilization	100%
Mass capacity utilisation	67%

(1) Technology mix, Euro 0, 1, 2, 3, 4

Parameters, C3 module	
Energy carrier	Electricity, low voltage {ES}
Consumption (kWh) (1)	1.27

(1) For declared unit

Parameters, C4 and D modules	
Recovery rate for metals (recycling)	95%
Recovery rate for glass (recycling)	30%
Recovery rate for plastics (energy valorization)	95%
Metals and plastics to landfill	5%
Glass to landfill	70%
Efficiency for materials recycling	90%
Efficiency for energy valorization	60%

For clarity in the results tables, only modules with a non-zero contribution to the impact categories and parameters stated in this EPD are shown.

Time representativeness

All primary information used for the development of this EPD is based on production data for aluminium profiles manufactured in 2018, 2019 and 2020 by STRUGAL at its facilities. Data for IGU, hardware, seals and other environmental aspects generated during door assembly are based on information updated to 2020.

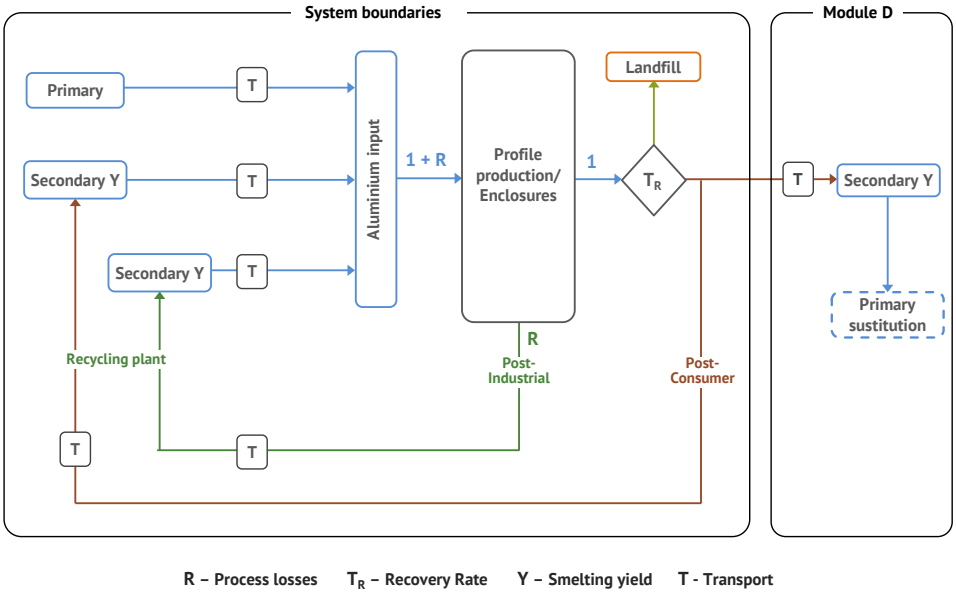
Database(s) and LCA software used

For all processes included in the LCA study, the Ecoinvent 3.6 database has been used.

The LCA study was carried out using a model based on excel templates. For the life cycle impact assessment (LCIA) of the above mentioned processes, the characterisation factors of the EC-JRC EF 2.0 method available at http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml.

Data Quality

All the activity data pertaining to the nuclear processes were collected through surveys and meetings held with the technical managers of STRUGAL. Data were collected on production, consumption of raw



materials and energy and the generation of waste, effluents and emissions. These inventories represent the average production of the aluminium profiles manufactured by STRUGAL and the door systems analysed. For those processes that are not under the control of the organisation, first-hand data from the aluminium sector were used to achieve the required accuracy, consistency and representativeness.

Specific regional databases have been used to include electricity, natural gas or diesel consumption in the life cycle inventory. For transport, raw material production or end-of-life processes, databases were chosen according to their technological and geographical representativeness of the actual process. Technological and geographical representativeness is ensured for all concerns included in the LCA, including those of greatest relevance to the final result. For example, for climate change, the technological representativeness of the processes that contribute 92% of the total value has been qualified as very good or good according to Annex E of the UNE EN 15804 standard. The environmental databases used are less than 3 years old.

Estimates and Assumptions

During the preparation of the inventories, it was possible to distinguish the energy consumption assigned to the main stages of production of aluminium profiles: extrusion, coating and anodising. The electricity consumed in the incorporation of the thermal break, in packaging, as well as in other common plant services, has been assigned to the total number of tonnes extruded. This assumption does not entail a significant loss of precision, as its impact on the final result has been found to be very low.

The surface treatments chosen to complete the coating and anodising processes are the most complete and those that require the use of the greatest amount of chemical products per square metre of surface treated, thus meeting a conservative criterion.

Information has been collected from STRUGAL's aluminium billet suppliers. In all cases, the geographical area of the manufacturer and the recycling content of all of them was taken into account. This recycling content amounts to 67%, which reduces the environmental impact of the incoming aluminium. This value also allows the balance of aluminium leaving the limits of the system to calculate the avoided impacts of module D.

All the aluminium scrap produced during the manufacturing of profiles together with the offcuts generated during the assembly of the doors (post-industrial scrap) is sent for recycling. Although this recycling process is in most cases carried out at a different location from where the scrap is generated, it has been modelled in all cases as an effective closed cycle as there is no loss of inherent properties of the aluminium during the process. In addition, the scrap is used in the production of the same products that generate it. Due to this circumstance, no load allocation has been carried out and it has been considered that the doors are the only product generated in module A1-3, with no other co-product. In this way, all post-industrial aluminium scrap is free of charge when it enters the system again.

In any case, it does include the transport to recycling of the scrap generated by STRUGAL and in the carpentries.

The materials and weight of the fittings and seals were obtained from the breakdown of the STRUGAL door systems. Not only the materials they are made of but also the manufacturing process such as extrusion or injection moulding in the case of plastic components or forging or machining in the case of metal components have been taken into account. In the case of UVA, the weight of some components such as glass, aluminium, zeolite, argon and sealants have been modelled from geometric calculations based on specifications together with density values obtained from material databases. Environmental aspects such as water and electricity consumed, or glass offcuts generated during the manufacturing of IGU, have been obtained from the ecoinvent database.

The assembly of the doors is not carried out by STRUGAL, but by carpentry companies, which have a production scale ranging from a few tens of doors per month to hundreds of windows per month. The aluminium profiles, fittings and seals are first transported to distribution centres and then, on request, to the carpentry shops. The assembly of the door requires the cutting and milling of the aluminium profiles. These operations are carried out dry, so no lubricants are used, while the shavings and offcuts are sent for recycling. The electricity consumed in these operations and the end of life of the aluminium profile packaging as well as the manufacture of the final door packaging materials have been included in the analysis. IGU is only installed once the window has been installed in the building and therefore follows a different route to the rest of the components, being sent directly to the building site from the glaziers.

In order to obtain the net aluminium output of the system at the end of the profiles' useful life, the scrap input at the production stage is subtracted from the scrap sent for recycling at the end of its useful life. In Module D, the environmental burdens and benefits of recycling the net scrap leaving the system are allocated. These environmental aspects have been assessed up to the point of functional equivalence (the point at which the replacement of primary aluminium takes place), i.e. the production of secondary aluminium billet. In this recycling process, the performance of the melting furnaces for each of the scrap fractions (anodised, coated and with thermal break) has been taken into account.

RESULTS

STRUGAL S72RPC

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
BASIC ENVIRONMENTAL IMPACTS	CC-2013	kg CO_2 eq	94.9	1.40	0.166	0.313	-17.9	97.6	1.39	0.166	0.310	-17.5
	CC-total	kg CO_2 eq	97.3	1.42	0.170	0.321	-18.5	100	1.40	0.170	0.318	-18.1
	CC-fossil	kg CO_2 eq	96.6	1.41	0.168	0.320	-18.0	99.2	1.40	0.168	0.317	-17.6
	CC-biogenic	kg CO_2 eq	0.294	7.60E-04	5.74E-04	2.27E-04	-0.135	0.571	7.54E-04	5.74E-04	2.25E-04	-0.133
	CC-luluc	kg CO_2 eq	0.416	5.03E-04	1.47E-03	1.08E-04	-0.372	0.447	4.99E-04	1.47E-03	1.08E-04	-0.361
	OD	kg CFC-11 eq	1.96E-03	3.22E-07	1.89E-08	8.19E-08	-2.68E-06	9.71E-06	3.19E-07	1.89E-08	8.18E-08	-2.63E-06
	A	mol H^+ eq	0.708	4.06E-03	1.48E-03	1.61E-03	-0.161	0.715	4.03E-03	1.48E-03	1.60E-03	-0.159
	EAF	kg P eq	5.21E-03	1.13E-05	7.47E-06	2.92E-06	-8.83E-04	3.57E-03	1.12E-05	7.47E-06	2.92E-06	-8.64E-04
	EAM	kg N eq	0.108	8.04E-04	2.31E-04	5.02E-04	-2.20E-02	0.110	7.98E-04	2.31E-04	5.00E-04	-2.18E-02
	ET	mol N eq	1.15	9.00E-03	2.59E-03	5.40E-03	-0.255	1.18	8.92E-03	2.59E-03	5.39E-03	-0.252
	POF	kg NMVOC eq	0.343	3.45E-03	6.97E-04	1.66E-03	-0.077	0.344	3.42E-03	6.97E-04	1.65E-03	-0.076
	AD-non fossil	kg Sb eq	1.12E-02	3.90E-05	6.48E-07	6.38E-06	-6.11E-03	9.25E-03	3.87E-05	6.48E-07	6.38E-06	-6.11E-03
	AD-fossil	MJ	1256	21.4	3.86	5.60	-337	1326	21.2	3.86	5.60	-330
	WU	m^3 eq	30.1	6.05E-02	0.112	0.115	-3.26	31.7	6.00E-02	0.112	0.115	-3.27
ADDITIONAL ENVIRONMENTAL IMPACTS	PM	Disease incidence	1.95E-03	8.99E-08	4.55E-09	3.03E-08	-1.54E-06	7.09E-06	8.91E-08	4.55E-09	3.03E-08	-1.51E-06
	IR	kBq U235 eq	4.84	0.093	4.13E-02	2.36E-02	-2.34	5.96	0.093	4.13E-02	2.36E-02	-2.30
	EF	CTUe	3090	17.2	2.73	4.71	-306	4150	17.1	2.73	4.64	-303
	HT-c	CTUh	1.95E-03	4.80E-10	6.59E-11	1.49E-10	-4.73E-08	1.39E-07	4.76E-10	6.59E-11	1.49E-10	-4.60E-08
	HT-nc	CTUh	1.95E-03	1.81E-08	2.05E-09	4.01E-09	-5.54E-07	3.08E-05	1.80E-08	2.05E-09	3.99E-09	-5.40E-07
	LU	Dimensionless	359	15.0	1.07	7.26	-45.6	378	14.8	1.07	7.25	-45.4

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals (1); **AD-fossil**: Abiotic resource depletion - fossils (1); **WU**: Water use (1); **PM**: Particulate matter emissions (1); **IR**: Ionising radiation (2); **EF**: Ecotoxicity - freshwater (1); **HT-c**: Human toxicity, cancer effects (1); **HT-nc**: Human toxicity, non-cancer effects (1); **LU**: Land use (1).

(1) The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

(2) This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

STRUGAL S72RPC

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
RESOURCE USE	PERE	MJ	199	3.06E-01	0.91	6.97E-02	-106	212	3.04E-01	0.91	6.96E-02	-104
	PERM	MJ	0	0	0	0	0	0	0	0	0	0
	PERT	MJ	199	3.07E-01	0.91	6.98E-02	-106	212	3.04E-01	0.91	6.96E-02	-104
	PENRE	MJ	1340	22.7	4.00	5.95	-357	1413	22.5	4.00	5.95	-350
	PENRM	MJ	0	0	0	0	0	0	0	0	0	0
	PENRT	MJ	1340	22.7	4.00	5.95	-357	1413	22.5	4.00	5.95	-350
	SM	kg	6.95	0	0	0	0	6.94	0	0	0	0
	RSF	MJ	0	0	0	0	0	0	0	0	0	0
	NRSF	MJ	0	0	0	0	0	0	0	0	0	0
	FW	m^3 eq	753	1.22	3.04	0.34	-255	780	1.21	3.04	0.34	-249
WASTE	HWD	kg	6.87E-02	0	0	0	1.86E-02	6.63E-02	0	0	0	1.80E-02
	NHWD	kg	22.1	1.04	0	16.0	-4.90	21.8	1.03	0	16.0	-4.78
	RWD	kg	6.20E-02	0	0	0	-2.10E-03	6.06E-02	0	0	0	-2.05E-03
OUTPUT FLOWS	CRU	kg	0	0	0	0	0	0	0	0	0	0
	MFR	kg	4.17	0	16.1	0	0	4.15	0	15.8	0	0
	MER	kg	0	0	0.96	0	0	0	0	0.96	0	0
	EE-e	MJ	0	0	29.0	0	0	0	0	29.0	0	0
	EE-t	MJ	0	0	0	0	0	0	0	0	0	0

RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE-e**: Exported energy (electricity); **EE-t**: Exported energy (thermal)

STRUGAL S88RP ELEVABLE

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
BASIC ENVIRONMENTAL IMPACTS	CC-2013	kg CO_2 eq	99.6	1.88	0.150	0.566	-18.3	102	1.87	0.150	0.565	-18.1
	CC-total	kg CO_2 eq	102	1.90	0.153	0.578	-18.8	104	1.89	0.153	0.577	-18.6
	CC-fossil	kg CO_2 eq	101	1.90	0.152	0.578	-18.4	103	1.89	0.152	0.576	-18.2
	CC-biogenic	kg CO_2 eq	0.439	1.02E-03	5.04E-04	4.94E-04	-0.172	0.627	1.02E-03	5.04E-04	4.93E-04	-0.171
	CC-luluc	kg CO_2 eq	0.304	6.75E-04	1.27E-03	2.01E-04	-0.271	0.325	6.72E-04	1.27E-03	2.01E-04	-0.265
	OD	kg CFC-11 eq	1.25E-03	4.31E-07	1.75E-08	1.52E-07	-2.98E-06	1.19E-05	4.30E-07	1.75E-08	1.52E-07	-2.95E-06
	A	mol H^+ eq	0.803	5.44E-03	1.35E-03	2.95E-03	-0.216	0.809	5.42E-03	1.35E-03	2.95E-03	-0.215
	EAF	kg P eq	4.27E-03	1.51E-05	6.62E-06	5.43E-06	-9.37E-04	3.24E-03	1.51E-05	6.62E-06	5.43E-06	-9.25E-04
	EAM	kg N eq	0.125	1.08E-03	2.25E-04	9.07E-04	-3.14E-02	0.126	1.07E-03	2.25E-04	9.06E-04	-3.13E-02
	ET	mol N eq	1.41	1.21E-02	2.52E-03	9.89E-03	-0.372	1.43	1.20E-02	2.52E-03	9.89E-03	-0.370
	POF	kg NMVOC eq	0.393	4.62E-03	6.81E-04	3.04E-03	-0.102	0.394	4.60E-03	6.81E-04	3.03E-03	-0.101
	AD-non fossil	kg Sb eq	2.24E-02	5.23E-05	7.25E-07	1.19E-05	-1.63E-02	2.12E-02	5.21E-05	7.25E-07	1.19E-05	-1.63E-02
	AD-fossil	MJ	1318	28.7	3.43	10.33	-390	1368	28.6	3.43	10.32	-386
	WU	m^3 eq	30.5	8.11E-02	0.097	0.213	-6.78	31.7	8.08E-02	0.097	0.213	-6.79
ADDITIONAL ENVIRONMENTAL IMPACTS	PM	Disease incidence	1.25E-03	1.20E-07	5.46E-09	5.61E-08	-1.82E-06	8.05E-06	1.20E-07	5.46E-09	5.61E-08	-1.80E-06
	IR	kBq U235 eq	4.62	0.125	3.61E-02	4.36E-02	-2.69	5.40	0.125	3.61E-02	4.36E-02	-2.66
	EF	CTUe	2886	23.1	2.53	8.42	-525	3607	23.0	2.53	8.38	-524
	HT-c	CTUh	1.24E-03	6.43E-10	6.86E-11	2.41E-10	-3.83E-08	1.20E-07	6.40E-10	6.86E-11	2.41E-10	-3.75E-08
	HT-nc	CTUh	1.25E-03	2.43E-08	1.96E-09	7.39E-09	-5.61E-07	2.12E-05	2.42E-08	1.96E-09	7.38E-09	-5.53E-07
	LU	Dimensionless	428	20.0	1.29	13.4	-82.1	442	20.0	1.29	13.4	-81.9

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals (1); **AD-fossil**: Abiotic resource depletion - fossils (1); **WU**: Water use (1); **PM**: Particulate matter emissions (1); **IR**: Ionising radiation (2); **EF**: Ecotoxicity - freshwater (1); **HT-c**: Human toxicity, cancer effects (1); **HT-nc**: Human toxicity, non-cancer effects (1); **LU**: Land use (1).

(1) The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

(2) This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

STRUGAL S88RP ELEVABLE

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
RESOURCE USE	PERE	MJ	160	4.10E-01	0.81	1.28E-01	-92,5	169	4.09E-01	0.81	1.28E-01	-90.9
	PERM	MJ	0	0	0	0	0	0	0	0	0	0
	PERT	MJ	160	4.11E-01	0.81	1.28E-01	-92,5	169	4.09E-01	0.81	1.28E-01	-90.9
	PENRE	MJ	1411	30.4	3.56	10.97	-413	1463	30.3	3.56	10.96	-409
	PENRM	MJ	0	0	0	0	0	0	0	0	0	0
	PENRT	MJ	1411	30.4	3.56	10.97	-413	1463	30.3	3.56	10.96	-409
	SM	kg	5.20	0	0	0	0	5.19	0	0	0	0
	RSF	MJ	0	0	0	0	0	0	0	0	0	0
	NRSF	MJ	0	0	0	0	0	0	0	0	0	0
	FW	m^3 eq	588	1.63	2.65	0.57	-244	607	1.63	2.65	0.57	-240
WASTE	HWD	kg	5.13E-02	0	0	0	1.00E-02	4.98E-02	0	0	0	9.66E-03
	NHWD	kg	20.9	1.39	0	29.5	-4.15	20.8	1.39	0	29.5	-4.07
	RWD	kg	4.58E-02	0	0	0	-2.32E-03	4.49E-02	0	0	0	-2.30E-03
OUTPUT FLOWS	CRU	kg	0	0	0	0	0	0	0	0	0	0
	MFR	kg	5.17	0	19.4	0	0	5.16	0	19.2	0	0
	MER	kg	0	0	1.96	0	0	0	0	1.96	0	0
	EE-e	MJ	0	0	59.1	0	0	0	0	59.1	0	0
	EE-t	MJ	0	0	0	0	0	0	0	0	0	0

RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE-e**: Exported energy (electricity); **EE-t**: Exported energy (thermal)

STRUGAL S125RP

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
BASIC ENVIRONMENTAL IMPACTS	CC-2013	kg CO_2 eq	98,2	1.59	0.129	0.368	-19.1	101	1.58	0.129	0.366	-18.7
	CC-total	kg CO_2 eq	101	1.61	0.132	0.376	-19.7	104	1.60	0.132	0.374	-19.3
	CC-fossil	kg CO_2 eq	100	1.61	0.130	0.376	-19.2	102	1.59	0.130	0.373	-18.8
	CC-biogenic	kg CO_2 eq	0.435	8.63E-04	4.38E-04	2.73E-04	-0.167	0.708	8.57E-04	4.38E-04	2.71E-04	-0.165
	CC-luluc	kg CO_2 eq	0.432	5.71E-04	1.11E-03	1.29E-04	-0.365	0.463	5.67E-04	1.11E-03	1.29E-04	-0.355
	OD	kg CFC-11 eq	1.83E-03	3.65E-07	1.48E-08	9.80E-08	-2.86E-06	1.08E-05	3.63E-07	1.48E-08	9.79E-08	-2.81E-06
	A	mol H^+ eq	0.755	4.61E-03	1.16E-03	1.93E-03	-0.181	0.763	4.58E-03	1.16E-03	1.93E-03	-0.179
	EAF	kg P eq	5.30E-03	1.28E-05	5.73E-06	3.50E-06	-9.86E-04	3.80E-03	1.27E-05	5.73E-06	3.49E-06	-9.67E-04
	EAM	kg N eq	0.113	9.13E-04	1.86E-04	6.02E-04	-2.57E-02	0.115	9.07E-04	1.86E-04	6.01E-04	-2.54E-02
	ET	mol N eq	1.25	1.02E-02	2.09E-03	6.50E-03	-0.298	1.28	1.01E-02	2.09E-03	6.50E-03	-0.295
	POF	kg NMVOC eq	0.365	3.91E-03	5.63E-04	1.99E-03	-0.088	0.367	3.88E-03	5.63E-04	1.99E-03	-0.087
	AD-non fossil	kg Sb eq	2.81E-02	4.43E-05	5.66E-07	7.59E-06	-2.10E-02	2.63E-02	4.40E-05	5.66E-07	7.58E-06	-2.10E-02
	AD-fossil	MJ	1279	24.3	2.97	6.70	-361	1351	24.1	2.97	6.70	-355
	WU	m^3 eq	28.6	6.87E-02	0.085	0.139	-4.38	30.3	6.82E-02	0.085	0.139	-4.38
ADDITIONAL ENVIRONMENTAL IMPACTS	PM	Disease incidence	1.83E-03	1.02E-07	4.14E-09	3.64E-08	-1.71E-06	7.50E-06	1.01E-07	4.14E-09	3.63E-08	-1.68E-06
	IR	kBq U235 eq	5.09	0.106	3.15E-02	2.82E-02	-2.44	6.21	0.105	3.15E-02	2.82E-02	-2.40
	EF	CTUe	3354	19.6	2.15	5.49	-483	4399	19.4	2.15	5.42	-481
	HT-c	CTUh	1.82E-03	5.44E-10	5.52E-11	1.77E-10	-5.32E-08	1.59E-07	5.41E-10	5.52E-11	1.77E-10	-5.20E-08
	HT-nc	CTUh	1.83E-03	2.06E-08	1.64E-09	4.76E-09	-6.91E-07	3.04E-05	2.05E-08	1.64E-09	4.75E-09	-6.78E-07
	LU	Dimensionless	386	17.0	0.98	8.73	-57.7	406	16.9	0.98	8.72	-57.5

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals (1); **AD-fossil**: Abiotic resource depletion - fossils (1); **WU**: Water use (1); **PM**: Particulate matter emissions (1); **IR**: Ionising radiation (2); **EF**: Ecotoxicity - freshwater (1); **HT-c**: Human toxicity, cancer effects (1); **HT-nc**: Human toxicity, non-cancer effects (1); **LU**: Land use (1).

(1) The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

(2) This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

STRUGAL S125RP

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
RESOURCE USE	PERE	MJ	208	3.47E-01	0.70	8.31E-02	-107	220	3.45E-01	0.70	8.30E-02	-104
	PERM	MJ	0	0	0	0	0	0	0	0	0	0
	PERT	MJ	208	3.48E-01	0.70	8.32E-02	-107	220	3.46E-01	0.70	8.31E-02	-104
	PENRE	MJ	1365	25.8	3.07	7.12	-383	1440	25.6	3.07	7.11	-376
	PENRM	MJ	0	0	0	0	0	0	0	0	0	0
	PENRT	MJ	1365	25.8	3.07	7.12	-383	1440	25.6	3.07	7.11	-376
	SM	kg	7.61	0	0	0	0	7.60	0	0	0	0
	RSF	MJ	0	0	0	0	0	0	0	0	0	0
	NRSF	MJ	0	0	0	0	0	0	0	0	0	0
	FW	m^3 eq	792	1.38	2.31	0.41	-260	819	1.37	2.31	0.41	-254
WASTE	HWD	kg	7.49E-02	0	0	0	1.61E-02	7.27E-02	0	0	0	1.55E-02
	NHWD	kg	23.8	1.18	0	19.4	-5.14	23.5	1.17	0	19.3	-5.02
	RWD	kg	6.57E-02	0	0	0	-2.19E-03	6.44E-02	0	0	0	-2.15E-03
OUTPUT FLOWS	CRU	kg	0	0	0	0	0	0	0	0	0	0
	MFR	kg	4.47	0	18.4	0	0	4.45	0	18.1	0	0
	MER	kg	0	0	1.01	0	0	0	0	1.01	0	0
	EE-e	MJ	0	0	30.3	0	0	0	0	30.3	0	0
	EE-t	MJ	0	0	0	0	0	0	0	0	0	0

RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE-e**: Exported energy (electricity); **EE-t**: Exported energy (thermal)

STRUGAL S140RP INFINITY

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
BASIC ENVIRONMENTAL IMPACTS	CC-2013	kg CO_2 eq	94.2	1.66	0.141	0.530	-19.2	95.6	1.65	0.141	0.529	-19.0
	CC-total	kg CO_2 eq	96.3	1.67	0.144	0.543	-19.8	97.9	1.67	0.144	0.542	-19.5
	CC-fossil	kg CO_2 eq	95.7	1.67	0.142	0.543	-19.3	97.1	1.67	0.142	0.541	-19.1
	CC-biogenic	kg CO_2 eq	0.354	8.99E-04	4.76E-04	4.48E-04	-0.158	0.515	8.95E-04	4.76E-04	4.46E-04	-0.157
	CC-luluc	kg CO_2 eq	0.286	5.95E-04	1.20E-03	1.86E-04	-0.302	0.303	5.93E-04	1.20E-03	1.86E-04	-0.296
	OD	kg CFC-11 eq	1.20E-03	3.80E-07	1.64E-08	1.39E-07	-3.06E-06	1.18E-05	3.79E-07	1.64E-08	1.39E-07	-3.03E-06
	A	mol H^+ eq	0.740	4.80E-03	1.27E-03	2.63E-03	-0.218	0.743	4.78E-03	1.27E-03	2.63E-03	-0.216
	EAF	kg P eq	4.06E-03	1.34E-05	6.24E-06	4.96E-06	-9.79E-04	3.05E-03	1.33E-05	6.24E-06	4.96E-06	-9.67E-04
	EAM	kg N eq	0.114	9.51E-04	2.08E-04	8.01E-04	-3.09E-02	0.115	9.47E-04	2.08E-04	8.00E-04	-3.08E-02
	ET	mol N eq	1.30	1.06E-02	2.34E-03	8.71E-03	-0.364	1.32	1.06E-02	2.34E-03	8.71E-03	-0.362
	POF	kg NMVOC eq	0.364	4.08E-03	6.30E-04	2.69E-03	-0.100	0.364	4.06E-03	6.30E-04	2.69E-03	-0.100
	AD-non fossil	kg Sb eq	1.34E-02	4.62E-05	6.57E-07	1.12E-05	-8.74E-03	1.22E-02	4.60E-05	6.57E-07	1.12E-05	-8.74E-03
	AD-fossil	MJ	1270	25.3	3.23	9.43	-426	1309	25.2	3.23	9.43	-422
	WU	m^3 eq	28.6	7.16E-02	0.092	0.184	-7.65	29.6	7.13E-02	0.092	0.184	-7.65
ADDITIONAL ENVIRONMENTAL IMPACTS	PM	Disease incidence	1.19E-03	1.06E-07	4.89E-09	5.05E-08	-1.65E-06	7.39E-06	1.06E-07	4.89E-09	5.05E-08	-1.63E-06
	IR	kBq U235 eq	4.26	0.111	3.41E-02	3.99E-02	-3.27	4.91	0.110	3.41E-02	3.99E-02	-3.24
	EF	CTUe	2793	20.4	2.37	7.91	-446	3409	20.3	2.37	7.87	-444
	HT-c	CTUh	1.19E-03	5.67E-10	6.28E-11	2.20E-10	-3.44E-08	1.07E-07	5.65E-10	6.28E-11	2.20E-10	-3.36E-08
	HT-nc	CTUh	1.19E-03	2.15E-08	1.82E-09	6.87E-09	-4.96E-07	1.86E-05	2.14E-08	1.82E-09	6.86E-09	-4.88E-07
	LU	Dimensionless	395	17.7	1.16	11.9	-81.4	406	17.6	1.16	11.9	-81.3

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals (1); **AD-fossil**: Abiotic resource depletion - fossils (1); **WU**: Water use (1); **PM**: Particulate matter emissions (1); **IR**: Ionising radiation (2); **EF**: Ecotoxicity - freshwater (1); **HT-c**: Human toxicity, cancer effects (1); **HT-nc**: Human toxicity, non-cancer effects (1); **LU**: Land use (1).

(1) The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

(2) This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

STRUGAL S140RP INFINITY

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
RESOURCE USE	PERE	MJ	149	3.62E-01	0.76	1.18E-01	-107	156	3.60E-01	0.76	1.18E-01	-105
	PERM	MJ	0	0	0	0	0	0	0	0	0	0
	PERT	MJ	149	3.63E-01	0.76	1.18E-01	-107	156	3.61E-01	0.76	1.18E-01	-105
	PENRE	MJ	1359	26.8	3.35	10.01	-450	1400	26.7	3.35	10.01	-446
	PENRM	MJ	0	0	0	0	0	0	0	0	0	0
	PENRT	MJ	1359	26.8	3.35	10.01	-450	1400	26.7	3.35	10.01	-446
	SM	kg	4.43	0	0	0	0	4.43	0	0	0	0
	RSF	MJ	0	0	0	0	0	0	0	0	0	0
	NRSF	MJ	0	0	0	0	0	0	0	0	0	0
	FW	m^3 eq	553	1.44	2.50	0.53	-290	568	1.43	2.50	0.53	-286
WASTE	HWD	kg	4.51E-02	0	0	0	1.16E-02	4.36E-02	0	0	0	1.12E-02
	NHWD	kg	19.8	1.23	0	25.3	-4.17	19.6	1.22	0	25.3	-4.09
	RWD	kg	4.09E-02	0	0	0	-2.71E-03	4.00E-02	0	0	0	-2.68E-03
OUTPUT FLOWS	CRU	kg	0	0	0	0	0	0	0	0	0	0
	MFR	kg	4.05	0	16.7	0	0	4.03	0	16.5	0	0
	MER	kg	0	0	2.89	0	0	0	0	2.89	0	0
	EE-e	MJ	0	0	86.9	0	0	0	0	86.9	0	0
	EE-t	MJ	0	0	0	0	0	0	0	0	0	0

RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE-e**: Exported energy (electricity); **EE-t**: Exported energy (thermal)

STRUGAL S150RP

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
BASIC ENVIRONMENTAL IMPACTS	CC-2013	kg CO_2 eq	140	2.68	0.173	0.762	-26.7	143	2.67	0.173	0.760	-26.4
	CC-total	kg CO_2 eq	143	2.70	0.176	0.779	-27.6	147	2.69	0.176	0.776	-27.2
	CC-fossil	kg CO_2 eq	142	2.70	0.174	0.778	-26.9	145	2.69	0.174	0.775	-26.5
	CC-biogenic	kg CO_2 eq	0.679	1.45E-03	5.72E-04	6.47E-04	-0.245	0.959	1.45E-03	5.72E-04	6.45E-04	-0.243
	CC-luluc	kg CO_2 eq	0.491	9.62E-04	1.44E-03	2.71E-04	-0.431	0.522	9.58E-04	1.44E-03	2.71E-04	-0.421
	OD	kg CFC-11 eq	1.80E-03	6.15E-07	2.03E-08	2.05E-07	-4.31E-06	1.67E-05	6.12E-07	2.03E-08	2.05E-07	-4.26E-06
	A	mol H^+ eq	1.138	7.76E-03	1.56E-03	4.00E-03	-0.302	1.148	7.73E-03	1.56E-03	4.00E-03	-0.300
	EAF	kg P eq	6.24E-03	2.16E-05	7.55E-06	7.33E-06	-1.35E-03	4.78E-03	2.15E-05	7.55E-06	7.33E-06	-1.33E-03
	EAM	kg N eq	0.173	1.54E-03	2.65E-04	1.24E-03	-4.35E-02	0.175	1.53E-03	2.65E-04	1.23E-03	-4.32E-02
	ET	mol N eq	1.98	1.72E-02	2.97E-03	1.35E-02	-0.513	2.01	1.71E-02	2.97E-03	1.35E-02	-0.510
	POF	kg NMVOC eq	0.551	6.58E-03	8.04E-04	4.13E-03	-0.142	0.553	6.56E-03	8.04E-04	4.12E-03	-0.141
	AD-non fossil	kg Sb eq	2.93E-02	7.46E-05	8.91E-07	1.60E-05	-2.12E-02	2.75E-02	7.43E-05	8.91E-07	1.60E-05	-2.12E-02
	AD-fossil	MJ	1836	40.9	3.92	13.97	-553	1912	40.7	3.92	13.97	-547
	WU	m^3 eq	39.6	1.16E-01	0.110	0.290	-8.63	41.4	1.15E-01	0.110	0.289	-8.63
ADDITIONAL ENVIRONMENTAL IMPACTS	PM	Disease incidence	1.79E-03	1.72E-07	6.83E-09	7.60E-08	-2.63E-06	1.13E-05	1.71E-07	6.83E-09	7.60E-08	-2.61E-06
	IR	kBq U235 eq	6.81	0.179	4.10E-02	5.90E-02	-3.76	7.97	0.178	4.10E-02	5.89E-02	-3.72
	EF	CTUe	4151	32.9	2.94	11.31	-707	5223	32.8	2.94	11.24	-704
	HT-c	CTUh	1.78E-03	9.16E-10	8.25E-11	3.34E-10	-5.89E-08	1.80E-07	9.13E-10	8.25E-11	3.34E-10	-5.77E-08
	HT-nc	CTUh	1.79E-03	3.47E-08	2.30E-09	9.96E-09	-8.20E-07	3.14E-05	3.45E-08	2.30E-09	9.95E-09	-8.07E-07
	LU	Dimensionless	597	28.6	1.62	18.2	-109	619	28.5	1.62	18.2	-109

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals (1); **AD-fossil**: Abiotic resource depletion - fossils (1); **WU**: Water use (1); **PM**: Particulate matter emissions (1); **IR**: Ionising radiation (2); **EF**: Ecotoxicity - freshwater (1); **HT-c**: Human toxicity, cancer effects (1); **HT-nc**: Human toxicity, non-cancer effects (1); **LU**: Land use (1).

(1) The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

(2) This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

STRUGAL S150RP

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
RESOURCE USE	PERE	MJ	250	5.85E-01	0.92	1.73E-01	-139	264	5.83E-01	0.92	1.73E-01	-137
	PERM	MJ	0	0	0	0	0	0	0	0	0	0
	PERT	MJ	250	5.86E-01	0.92	1.73E-01	-139	264	5.83E-01	0.92	1.73E-01	-137
	PENRE	MJ	1963	43.4	4.06	14.84	-586	2044	43.2	4.06	14.83	-580
	PENRM	MJ	0	0	0	0	0	0	0	0	0	0
	PENRT	MJ	1963	43.4	4.06	14.84	-586	2044	43.2	4.06	14.83	-580
	SM	kg	8.69	0	0	0	0	8.68	0	0	0	0
	RSF	MJ	0	0	0	0	0	0	0	0	0	0
	NRSF	MJ	0	0	0	0	0	0	0	0	0	0
	FW	m^3 eq	927	2.33	3.00	0.79	-356	955	2.32	3.00	0.79	-351
WASTE	HWD	kg	8.54E-02	0	0	0	1.77E-02	8.33E-02	0	0	0	1.71E-02
	NHWD	kg	30.8	1.99	0	40.2	-6.35	30.6	1.98	0	40.2	-6.23
	RWD	kg	7.65E-02	0	0	0	-3.29E-03	7.52E-02	0	0	0	-3.26E-03
OUTPUT FLOWS	CRU	kg	0	0	0	0	0	0	0	0	0	0
	MFR	kg	6.97	0	28.5	0	0	6.94	0	28.2	0	0
	MER	kg	0	0	2.39	0	0	0	0	2.39	0	0
	EE-e	MJ	0	0	72.0	0	0	0	0	72.0	0	0
	EE-t	MJ	0	0	0	0	0	0	0	0	0	0

RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE-e**: Exported energy (electricity); **EE-t**: Exported energy (thermal)

STRUGAL S160RP HORIZON

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
BASIC ENVIRONMENTAL IMPACTS	CC-2013	kg CO_2 eq	118	2.30	0.169	0.749	-22.2	120	2.30	0.169	0.748	-21.9
	CC-total	kg CO_2 eq	121	2.33	0.173	0.765	-22.8	122	2.32	0.173	0.763	-22.6
	CC-fossil	kg CO_2 eq	120	2.32	0.171	0.764	-22.3	121	2.32	0.171	0.763	-22.0
	CC-biogenic	kg CO_2 eq	0.495	1.25E-03	5.61E-04	6.69E-04	-0.190	0.665	1.25E-03	5.61E-04	6.68E-04	-0.189
	CC-luluc	kg CO_2 eq	0.320	8.27E-04	1.41E-03	2.67E-04	-0.322	0.339	8.25E-04	1.41E-03	2.67E-04	-0.316
	OD	kg CFC-11 eq	1.24E-03	5.29E-07	1.99E-08	2.01E-07	-3.72E-06	1.50E-05	5.27E-07	1.99E-08	2.01E-07	-3.69E-06
	A	mol H^+ eq	0.975	6.68E-03	1.53E-03	3.88E-03	-0.273	0.979	6.65E-03	1.53E-03	3.88E-03	-0.272
	EAF	kg P eq	4.66E-03	1.86E-05	7.40E-06	7.19E-06	-1.08E-03	3.62E-03	1.85E-05	7.40E-06	7.19E-06	-1.07E-03
	EAM	kg N eq	0.150	1.32E-03	2.58E-04	1.19E-03	-3.91E-02	0.151	1.32E-03	2.58E-04	1.19E-03	-3.89E-02
	ET	mol N eq	1.74	1.48E-02	2.90E-03	1.30E-02	-0.465	1.76	1.47E-02	2.90E-03	1.30E-02	-0.463
	POF	kg NMVOC eq	0.474	5.66E-03	7.84E-04	3.99E-03	-0.125	0.475	5.64E-03	7.84E-04	3.99E-03	-0.125
	AD-non fossil	kg Sb eq	7.23E-03	6.41E-05	8.64E-07	1.58E-05	-2.91E-03	6.01E-03	6.39E-05	8.64E-07	1.58E-05	-2.91E-03
	AD-fossil	MJ	1559	35.1	3.84	13.66	-493	1601	35.0	3.84	13.65	-489
	WU	m^3 eq	32.8	9.94E-02	0.108	0.279	-8.62	33.8	9.91E-02	0.108	0.278	-8.62
ADDITIONAL ENVIRONMENTAL IMPACTS	PM	Disease incidence	1.24E-03	1.48E-07	6.61E-09	7.41E-08	-2.21E-06	9.77E-06	1.47E-07	6.61E-09	7.40E-08	-2.19E-06
	IR	kBq U235 eq	5.27	0.154	4.02E-02	5.78E-02	-3.51	5.97	0.153	4.02E-02	5.77E-02	-3.48
	EF	CTUe	3363	28.3	2.87	11.11	-502	4016	28.2	2.87	11.06	-500
	HT-c	CTUh	1.23E-03	7.88E-10	8.03E-11	3.10E-10	-3.64E-08	1.22E-07	7.86E-10	8.03E-11	3.10E-10	-3.56E-08
	HT-nc	CTUh	1.23E-03	2.98E-08	2.24E-09	9.80E-09	-5.18E-07	1.98E-05	2.97E-08	2.24E-09	9.79E-09	-5.09E-07
	LU	Dimensionless	526	24.6	1.57	17.7	-103	538	24.5	1.57	17.7	-103

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals (1); **AD-fossil**: Abiotic resource depletion - fossils (1); **WU**: Water use (1); **PM**: Particulate matter emissions (1); **IR**: Ionising radiation (2); **EF**: Ecotoxicity - freshwater (1); **HT-c**: Human toxicity, cancer effects (1); **HT-nc**: Human toxicity, non-cancer effects (1); **LU**: Land use (1).

(1) The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

(2) This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

STRUGAL S160RP HORIZON

			COATED					ANODIZED				
			A1-3	C2	C3	C4	D	A1-3	C2	C3	C4	D
RESOURCE USE	PERE	MJ	173	5.03E-01	0.90	1.69E-01	-115	181	5.01E-01	0.90	1.69E-01	-113
	PERM	MJ	0	0	0	0	0	0	0	0	0	0
	PERT	MJ	173	5.04E-01	0.90	1.69E-01	-115	181	5.02E-01	0.90	1.69E-01	-113
	PENRE	MJ	1669	37.3	3.98	14.50	-521	1713	37.2	3.98	14.50	-517
	PENRM	MJ	0	0	0	0	0	0	0	0	0	0
	PENRT	MJ	1669	37.3	3.98	14.50	-521	1713	37.2	3.98	14.50	-517
	SM	kg	4.95	0	0	0	0	4.95	0	0	0	0
	RSF	MJ	0	0	0	0	0	0	0	0	0	0
	NRSF	MJ	0	0	0	0	0	0	0	0	0	0
	FW	m^3 eq	636	2.00	2.94	0.74	-307	652	2.00	2.94	0.74	-304
WASTE	HWD	kg	4.94E-02	0	0	0	1.33E-02	4.79E-02	0	0	0	1.29E-02
	NHWD	kg	24.4	1.71	0	38.6	-4.70	24.2	1.70	0	38.6	-4.62
	RWD	kg	4.64E-02	0	0	0	-2.99E-03	4.55E-02	0	0	0	-2.97E-03
OUTPUT FLOWS	CRU	kg	0	0	0	0	0	0	0	0	0	0
	MFR	kg	5.62	0	22.8	0	0	5.61	0	22.5	0	0
	MER	kg	0	0	2.94	0	0	0	0	2.94	0	0
	EE-e	MJ	0	0	88.6	0	0	0	0	88.6	0	0
	EE-t	MJ	0	0	0	0	0	0	0	0	0	0

RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE-e**: Exported energy (electricity); **EE-t**: Exported energy (thermal)

VERIFICATION

This EPD is in accordance with ISO 14025 and with the requirements set by the basic product category rules for construction products 15804:2012+A2:2019 and by the general rules of The International EPD® System programme. The specifications of the EN 17213 standard for environmental product declarations for windows and doors have also been met. The results shown in this EPD are based on the LCA report for STRUGAL products EPD dated 5 November 2021 according to ISO 14044.

This EPD does not contain comparative claims and its results are not comparable with other EPDs where these do not comply with the requirements set out in EN 15804. On the other hand, EPD with the same product category, but from different programmes, may not be comparable. This EPD is representative of the products covered.

The holder of this Declaration is responsible for its contents and for keeping the supporting documentation on which the statements and data contained therein are based for the period of validity of this Declaration.

EPD Programme	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
EPD registration number	S-P-05212
EPD owner	STRUGAL
Declared unit	1 m^2 of door
System boundaries	Cradle to gate with options
Published	2022 - 01 - 10
Valid until	2027 - 01 - 10
Reference year for data	2018-2019-2020
Geographical scope	Wordwide
Product group classification	UN CPC Code: 42120 Doors, windows and their frames and thresholds for doors, of iron, steel or aluminium
Product Category Rules	PCR 2019:14 Construction Products v1.0 and C-PCR-007 (to PCR 2019:14) Windows and Doors (EN 17213:2020) version: 2020-04-09. PCR moderator: Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se
PCR review was conducted by	Technical Committee of The International EPD® System
Independent verification of the declaration and data, according to ISO 14025:2006	☒ External ☐ Internal ☐ EPD®
Third-party verifier	Lorena Pereda Centro Tecnológico de Miranda de Ebro www. ctme.es
EPD prepared by	IDNÓVAM Innovación y desarrollo para el ambiente info@idnovam.com

REFERENCES

- General Programme Instructions of The International EPD® System. Version 3.01, 2019-09-18.
- Product Category Rules 2019:14 v1.0. Construction products. EPD System. Date 2019-12-20. Valid until 2024-12-20.
- EN 15804:2012+A2:2019, Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products
- EN 17213:2019 - Windows and doors - Environmental Product Declarations - Product category rules for
- windows and pedestrian doorsets
- PCR 2019:14-c-PCR-007 c-PCR-007 Windows and doors (EN 17213) (2020-04-09)
- ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental
- ISO 14040-44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment-Principles
- European Life Cycle Database. ELCD 3.3. http://eplca.jrc.ec.europa.eu/ELCD3/index.xhtml?stock=default
- Ecoinvent Database. http://www.ecoinvent.org/database/.
- Life-Cycle inventory data for aluminium production and transformation processes in Europe. Environmental Profile Report. February 2018.
- K. Peeters, C. Spirinckx, LOT 32 / Ecodesign of Window Products Task 2-Market Analysis, 2015.
- Tackling recycling aspects in EN15804 - Christian Leroy, Jean-Sebastien Thomas, Nick Avery, Jan Bollen, and Ladji Tikana. International Symposium on Life Cycle Assessment and Construction, 2012.
- Aluminium Recycling in LCA – European Aluminium Association, 2013.
- UNE-EN 16449:2014. Madera y productos derivados de a madera. Cálculo del contenido en carbono biogénico de la madera y conversión en dióxido de carbono.
- CES-Edupack, Granta design limited, 2019. http://www.grantadesign.com/education/edupack

CONTACTS

EPD PROGRAMME

The International EPD® System
EPD International AB
Box 210 60
SE-100 31 Stockholm
Sweden
www.environdec.com

THIRD-PARTY VERIFIER

Lorena Pereda
Centro Tecnológico de Miranda de Ebro
www. ctme.es
lpereda@ctme.es

EPD OWNER

Strugal 2 SL
Pol. Ind. La Red Sur, Calle 9, P14 41500
Alcalá de Guadaíra (Sevilla)
a.perez@strugal.com

EPD AUTHOR

IDNÓVAM
Innovación y desarrollo para el ambiente
Ferranz 56, bajo
28013 Madrid
druiz@idnovam.com

STRUGAL

www.strugal.com